Exhibit R-2, RDT&E Budget Item Justification	Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. Ocean Engineering Development 0603713N

COST ($ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total P.E. Cost	9.953	15.219	16.813	16.289	16.225	14.482	14.780	15.084	Continuing	Continuing
Deep Submergence Biomedical Development/S0099	3.741	4.005	3.779	3.784	3.750	3.908	3.989	4.070	Continuing	Continuing
Shallow Depth Diving Equipment/S0394	6.212	11.214	13.034	12.505	12.475	10.574	10.791	11.014	Continuing	Continuing
Quantity of RDT&E Articles & cost										

A. Mission Description and Budget Item Justification: Developments in this program will enable the U.S. Navy to overcome deficiencies that constrain underwater operations in the areas of search, location, rescue, recovery, salvage, construction, and protection of offshore assets. This program develops medical technology, diver life support equipment, and the vehicles, systems, and tools to permit manned underwater operations.

B. Program Change Summary:

	FY 1998	FY 1999	FY 2000
FY 1999 President's Budget:	10.283	15.257	17.103
Appropriated Value:	12.658	15.257	
Adjustment to FY 1998 Appropriated Value/			
FY 1999 President's Budget:	-2.705	-.038	-.290
FY 2000/01 PRES Budget Submit:	9.953	15.219	16.813

Funding: The FY 98 decrease of $2.705M results from the 62207 FY 98 SBIR Reduction ($263K), 62371 DD1002: April 1998 Update Reduction ($32K), 64022 BTR Issue Addition ($23K), 64543 FY 1998 Update Reduction ($58K), Undistributed Reduction ($375K), and Shallow Water Diving Equipment Reprogramming ($2,000). The FY 99 decrease of $0.038M results from the 64128 Sec. 8108 Revised Economic Assumption Reduction ($35K) and 64231 Civilian Personnel Underexecution Reduction ($3K). The FY 00 decrease of $0.290M results from the 62288 Outsourcing Adjustment Reduction ($30K), 66547 PBD 604: Non Pay Inflation Reduction ($244K) and 66748 Additional Inflation Reduction ($16K).

The FY 98 decrease of $2.647M results from the 62207 FY 98 SBIR Reduction ($263K), 62371 DD1002: April 1998 Update Reduction ($32K), 64022 BTR Issue Addition ($23K) and.

Schedule: Not applicable.

Technical: Not applicable.

Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	Program Element Name & No. Ocean Engineering Development 0603713N	Project Name and Number. Deep Submergence Biomedical Development/S0099

Cost ($ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	3.741	4.005	3.779	3.784	3.750	3.908	3.989	4.070	Continuing	Continuing
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification: Develops advanced biomedical/bioengineering technology for enhancing medical and life support for submarine escape and rescue; and for diver safety and effectiveness; supports deeper, longer, safer, more flexible dives. Deliverables include: a) exposure guidance for DISSUB atmospheric contaminants, underwater continuous and impulsive noise, underwater blast, oxygen breathing, and diving depth/time profiles; b) medical procedures for life support on DISSUB, submarine escape and rescue (including new Submarine Rescue Diving and Recompression System, SRDRS), prevention and treatment of decompression illness, c) technologies to assess underwater noise and DISSUB life support parameters; enable non-chemical CO2 scrubbing; predict decompression risk in diving; provide DISSUB senior survivor with expert decision system, and enhance underwater swimming efficiency. Requirements: NAPDD #429-873, Deep Submergence Biomedical Development, 29 March 95.

Program Accomplishments and Plans:

FY 1998 Accomplishments:

- ($2.901) Plan for Diver Health and Safety Research: Validate nitrox decompression tables for 1.3 Atmosphere Absolute (ATA) Oxygen. Develop models to predict decompression stress from available data from human and animal diving database. Identify the effect of increased partial pressure of oxygen on incidence of decompression sickness. Define variables required to calculate optimal decompression procedures. Develop tables of pulmonary and Central Nervous System (CNS) oxygen toxicity and identify methods to prevent CNS oxygen toxicity, extend disabled submarine crew survival time. Using pig and sheep models of decompression sickness, investigate risk associated with delay of recompression on air divers. Investigate alternative decompression protocols for air saturated divers with emphasis on the early/aggressive use of oxygen. Validate existing procedures for surface decompression using oxygen.

- ($.480) Plan for Submarine Rescue: Investigate non-electrical methods for improvement of carbon dioxide scrubbing efficiency; review/extend 24 hour limits for contaminant exposure in disabled submarine environments, develop submarine escape and rescue algorithm, perform functional testing of submarine atmosphere monitoring equipment in a disabled submarine environment.

- ($.360) Plan for Underwater Sound: Develop dive site capability to measure underwater sound exposure. Deliver standards for exposure to non-impulsive underwater sound. Deliver unmanned underwater tool noise procedures.

Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	Program Element Name & No. Ocean Engineering Development 0603713N	Project Name and Number. Deep Submergence Biomedical Development/S0099

FY 1999 Plan:

- ($2.049) Plan for Diver Health and Safety Research: Deliver integrated set of diving decompression tables for air and nitrox. Develop methods to record variables (e.g. time, depth, water temp, decompression stress) during operational dives. Deliver tables of pulmonary and CNS oxygen toxicity and identify methods to prevent CNS oxygen toxicity. Develop one-atmosphere treatment protocols for decompression sickness using large animals. Develop adjustable, non-tethered diver thermal protection garment specifications; issue guidance for swimming efficiency. Deliver dive site capability to measure underwater sound exposure. Develop procedures for assessing underwater blast/impulse noise hazards; identify underwater acoustic threats to divers and develop strategy to protect divers; issue standardized tool noise assessment instruction.

- ($1.956) Plan for Submarine Rescue: Deliver Submarine escape and rescue Senior Survivor Expert decision aid (SEAREX) hardware & software, plus training recommendations for class SSN 688. Determine impact of hypothermia on crew survival in disabled submarine, refine estimates of crew escape time in disabled submarine scenario by actual trial, publish effects of low oxygen and high carbon dioxide on oxygen consumption; publish new guidance for passive CO2 scrubbing on DISSUB. Continue work on nitrox decompression and efforts to develop alternative decompression protocol for air saturated divers (DISSUB survivors) in DSRV and SRDRS described in FY98 Accomplishments

FY 2000 Plan:

- ($1.879) Plan for Diver Health and Safety Research: Develop new underwater thermal protection garments. Develop guidance for acceptable underwater breathing apparatus respiratory loads present in combination. Produce diving at altitude decompression tables. Deliver validated scaling procedures from animals to humans for decompression. Conduct manned test of one-atmosphere treatments for decompression sickness with divers. Determine damage risk thresholds for underwater blast/impulse noise. Develop protective materials and procedures against underwater sound threats to divers.

- ($1.900) Plan for Submarine Rescue: Deliver SEAREX and Guard Book package for SSBN 726 class. Issue DISSUB atmosphere contaminant exposure guidance. Deliver new markers for re-entry into fire-contaminated spaces. Publish revised Pressurized Submarine Rescue Manual. Develop guidance for decompression in SRDRS. Provide alternative to electrically-powered or passive CO2 scrubbing.

Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	Program Element Name & No. Ocean Engineering Development 0603713N	Project Name and Number. Deep Submergence Biomedical Development/S0099

B. Other Program Funding Summary: Not applicable.

Related RDT&E: Not Applicable.

C. Acquisition Strategy: Integrated thrust area teams (e.g. decompression research) are established with university, commercial and in-house Navy lab to jointly execute biomedical R&D; peer review of research proposals accomplished by independent Technical Advisory Board; annual review of progress by Executive Review Board (CNO/NAVSEA/ONR/BUMED); program management by 0-6 Medical Dept Officer; contracting by competitive process using BAA and leveraging ONR capabilities.

D. Schedule Profile: Not applicable

Exhibit R-3 Cost Analysis		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	PROGRAM ELEMENT NAME AND NUMBER Ocean Engineering Development 0603713N	PROJECT NAME AND NUMBER Deep Submergence Biomedical Development/S0099

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development												
Ancillary Hardware Development												
Systems Engineering												
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development												
Remarks: Not Applicable.												
Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks: Not Applicable.												

Exhibit R-3 Cost Analysis		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	PROGRAM ELEMENT NAME AND NUMBER Ocean Engineering Development 0603713N	PROJECT NAME AND NUMBER Deep Submergence Biomedical Development/S0099

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	Fy00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E												
Remarks: Not Applicable.												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support	WR	NEDU	3.741	4.005		3.779				Continuing	Continuing	
Program Management Personnel												
Travel										Continuing	Continuing	
Labor (Research Personnel)										Continuing	Continuing	
Overhead												
Subtotal Management			3.741	4.005		3.779				Continuing	Continuing	
Remarks: Not Applicable.												
Total Cost			17.752*	4.005		3.779				Continuing	Continuing	
Remarks: * Prior to FY98, funds were in Project M0099.												

Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	Program Element Name & No. Ocean Engineering Development 0603713N	Project Name and Number. Shallow Depth Diving Equipment/S0394

Cost ($ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	6.212	11.214	13.034	12.505	12.475	10.574	10.791	11.014	Continuing	Continuing
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification: This project is to develop systems to support submarine escape and rescue missions, and conventional diver operations. Diver operations include ship husbandry, salvage/recovery, and submarine rescue operations to support national, as well as, Navy needs around the world. Modern certifiable diving systems that ensure diver safety and allow maximum work efficiency will replace currently antiquated systems. Efforts are currently focused on the Submarine Rescue Diving and Recompression System (SRDRS) to provide a new rapidly deployed emergency submarine rescue capability. SRDRS will fill the gap created by the decommissioning of USS PIGEON (ASR 21) and USS ORTOLAN (ASR 22) and provide a new capability of pressurized transportation of rescuees from a stricken submarine directly to the decompression system eliminating the requirement for Deep Submergence Rescue Vehicles, Mother Submarines and Submarine Rescue Chambers. SRDRS is to include an air transportable rapid assessment/underwater work system, a decompression chamber system and a pressurized rescue module. The SRDRS will provide a global rapid response capability to support submarine rescue missions with an increase in capability at a fraction of the cost of the currently available systems.

Program Accomplishments and Plans:

FY 1998 Accomplishments:

- ($6.212) Submarine Rescue Diving and Recompression System: Continue acquisition of and acceptance testing of the prototype Assessment/Underwater Work System. Award contract for fabrication of prototype Submarine Decompression System. Complete preliminary design of Pressurized Rescue Module.

FY 1999 Plan:

- ($11.171) Submarine Rescue Diving and Recompression System: Complete acquisition of and continue acceptance testing of the prototype assessment/Underwater Work System. Continue fabrication of the prototype Submarine Decompression System. Solicit for detailed design and fabrication of the Pressurized Rescue Module. Complete design and award contract for Submarine Decompression System support equipment.

- ($0.258) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

FY 2000 Plan:

Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	Program Element Name & No. Ocean Engineering Development 0603713N	Project Name and Number. Shallow Depth Diving Equipment/S0394

- ($13.034) Submarine Rescue Diving and Recompression System: Complete acceptance testing of the prototype Assessment/Underwater Work System. Complete fabrication and acceptance testing of the prototype Submarine Decompression System and support equipment. Complete contract award for detailed design and fabrication of prototype Pressurized Rescue Module.

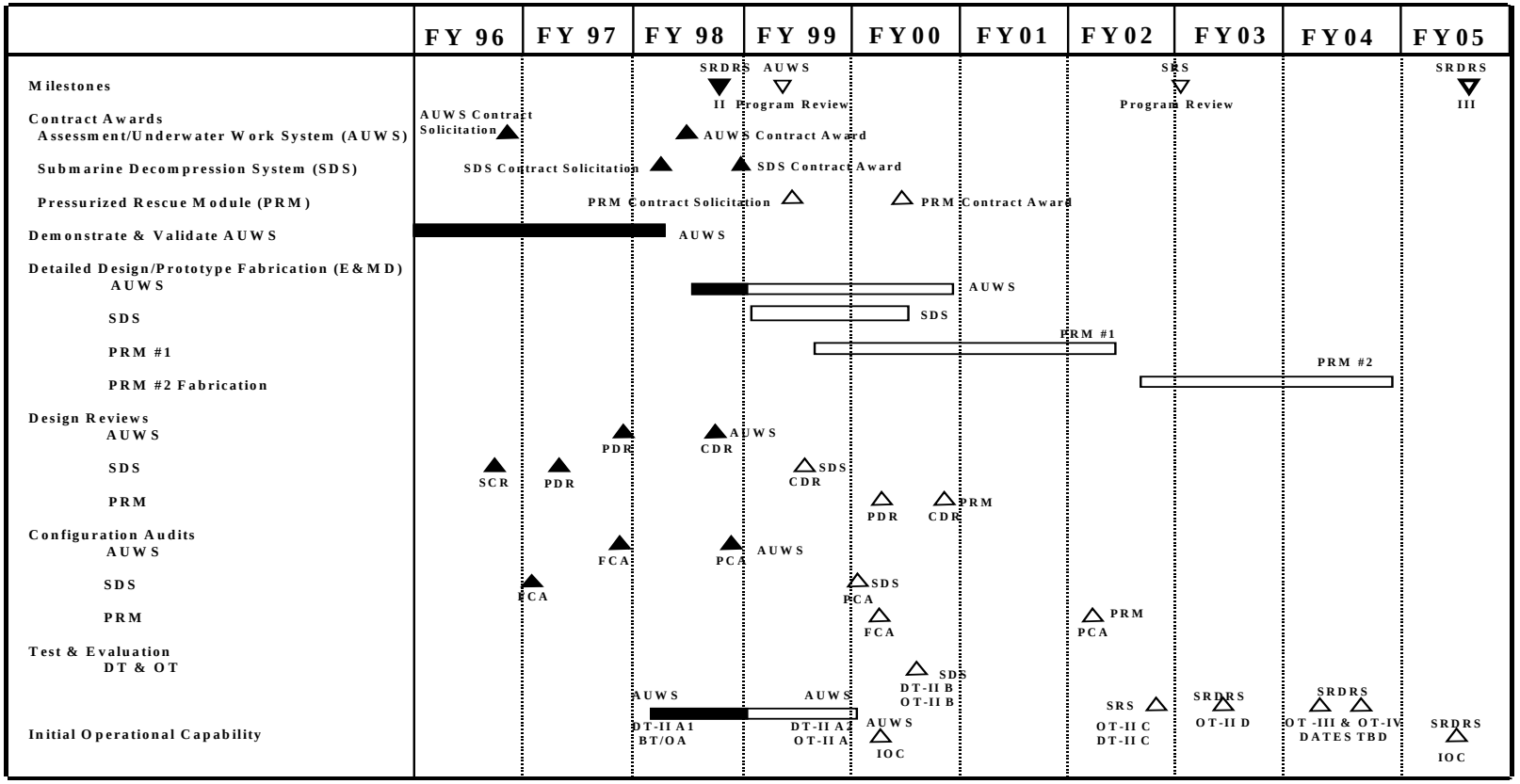
B. Other Program Funding Summary: Not applicable.

Related RDT&E: Not Applicable.

C. Acquisition Strategy: The Atmospheric Diving Suit (ADS) Segment of the SRDRS is a Non-Developmental Item (NDI) which is procured via a sole source contract. The Submarine Rescue System (SRS) segment of the SRDRS is largely based on the use of Commercial-Off –the-Shelf (COTS) technology and maximum use of Non-Developmental Items (NDI). The SRS segment is being procured using performance based specifications. The SRS contracts will be awarded competitively and will be based on technical capability and cost considerations (best value). Program Management of SRDRS is accomplished through the use of SEA 00C leadership of an Integrated Product Team (IPT). The Prototype system will provide full operational capability and no additional procurement is planned. The system is designed to be a Government Owned/Commercially Operated (GO/CO).

Exhibit R-2a, RDT&E Project Justification		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	Program Element Name & No. Ocean Engineering Development 0603713N	Project Name and Number. Shallow Depth Diving Equipment/S0394

D. Schedule Profile:



SRDRS Milestone Schedule

Exhibit R-3 Cost Analysis		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	PROGRAM ELEMENT NAME AND NUMBER Ocean Engineering Development 0603713N	PROJECT NAME AND NUMBER Shallow Depth Diving Equipment/S0394

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	CSS	16.259	1.960	12/98						18.219	
	CPAF	Oceaneering	9.078								9.078	9.078
	RC	NAVFAC	.900	2.340	12/98						1.950	
	Various	Miscellaneous	2.446	4.238		10.619				Continuing	Continuing	
Ancillary Hardware Development												
Systems Engineering	CPAF	Oceaneering		1.384	12/98						1.384	1.384
	Various	Miscellaneous				0.920				Continuing	Continuing	
Licenses												
Tooling												
GFE												
Award Fees		Oceaneering	.597	.112	12/98						.709	.709
Subtotal Product Development			29.280	10.034		11.539				Continuing	Continuing	
Remarks: Award Fees are 6%.												
Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support	Various	Miscellaneous		.080		.070				Continuing	Continuing	
Configuration Management	Various	Miscellaneous		.010		.015				Continuing	Continuing	
Technical Data	Various	Miscellaneous		.010		.020				Continuing	Continuing	
GFE												
Subtotal Support				.100		.105				Continuing	Continuing	
Remarks:												

Exhibit R-3 Cost Analysis		Date: February 1999
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA4	PROGRAM ELEMENT NAME AND NUMBER Ocean Engineering Development 0603713N	PROJECT NAME AND NUMBER Shallow Depth Diving Equipment/S0394

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	Fy00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	Various	Miscellaneous	.529	.100		.100				Continuing	Continuing	
Operational Test & Evaluation	Various	Miscellaneous		.200		.250				Continuing	Continuing	
Tooling												
GFE												
Subtotal T&E			.529	.300		.350				Continuing	Continuing	
Remarks:												
Contractor Engineering Support	Various	Miscellaneous	*	.448		.680				Continuing	Continuing	
Government Engineering Support	WR	NFESC	*	.172	12/98	.200				Continuing	Continuing	
Program Management Support												
Program Management Personnel												
Travel				.060		.060				Continuing	Continuing	
Labor (Research Personnel)			.453	.100		.100				Continuing	Continuing	
Overhead												
Subtotal Management			* .453	.780		1.040				Continuing	Continuing	
Remarks: *Prior years Contractor and Government Engineering support is included in Primary Hardware Development.												
Total Cost			30.262	11.214		13.034				Continuing	Continuing	
Remarks:												